e-ISSN: 0975-1556, p-ISSN:2820-2643

Available online on www.ijpcr.com

International Journal of Pharmaceutical and Clinical Research 2023; 15(5); 44-51

Original Research Article

A Prospective Randomised Study Comparing Postoperative Outcome after Regional or General Anesthesia for Incisional Hernia Surgery in Obese Patients

Priyesh Kumar[1], Raman Kumar[2], Harshwardhan[3], Smriti Kumari[4]

[1]Ex. Senior Resident, Department of Anaesthesiology, AIIMS Patna
[2]Ex. Senior Resident, Department of Anaesthesiology, RIMS Ranchi
[3]Assistant Prof. Department of Anaesthesiology, NMCH Patna
[4]3rd Year PG, Department of Anaesthesiology, NMCH Patna

Received: 04-03-2023 / Revised: 05-04-2023 / Accepted: 29-04-2023
Corresponding author: Dr. Raman Kumar
Conflict of interest: Nil

Abstract

Background and Objectives: Incisional hernia is the most frequent postoperative complication following abdominal surgery. The cumulative incidence has remained constant despite several attempts to improve laparotomy closure. Surgical closure technique, individual, biological and patient dependent risk factors play a key role. To test the efficacy and evaluate the impact of epidural anesthesia and postoperative epidural analgesia on postoperative outcomes in obese patients undergoing incisional hernia surgery.

Material and Methods: The aim of the study was to test the efficacy and evaluate the impact of epidural anesthesia and analgesia on postoperative outcomes in obese patients undergoing incisional hernia surgery. After obtaining institutional review board approval and written informed consent, an open randomized controlled trial was conducted on 60 patients scheduled for elective incisional hernia surgery.

Conclusion: Combined spinal epidural is a superior alternative technique to general anesthesia with parenteral opioids in the post operative management of incisional hernia surgery for obese patients. Combined spinal epidural technique provides better pain relief, early bowel recovery, less incidence of hypoxia and nausea and better patient satisfaction in postoperative period in obese patients.

Keywords: Incisional Hernia, Hypoxia, Epidural Anesthesia.

Introduction

Incisional hernia is the most frequent postoperative complication following abdominal surgery. The cumulative incidence has remained constant despite several attempts to improve laparotomy closure. Surgical closure technique, individual, biological and patient dependent risk factors play a key role. Recent advances in anesthesia techniques, adequate prevention and treatment of infection duringsurgery, and the use of new suture materials though have reduced the incidence of incisional hernia. Nevertheless, incisional hernia still occurs in 0.5% to 11% of all laparotomies performed. It has been estimated that about half of incisional hernias will develop within 3 months of the initial abdominal procedure. Surgical repair may be established by open or laparoscopic

approaches. Some of the well-known factors affecting recurrence rates are obesity, large incision size, preoperative presence of meshand postoperative wound infection. Incisional hernia surgery is considered as a major abdominal procedure and can be performed under general anesthesia, regional anesthesia or both combined together. Any surgery is associated with stress responses, and this contribute to various organ dysfunctions. Pain relief may be a powerful technique to modify surgical stress response. It has been assumed that sufficient pain relief will improve the surgical outcome and there is a common consensus that optimal pain relief is a prerequisite for early postoperative recovery. [5] The effect of epidural anesthesia and analgesia on high risk patients coming for major abdominal surgery has been studied in mid 1980s by Yeager and colleagues on 53 patients, which has shown significant improvement in postoperative outcome. [1,4] Multimodal analgesia programs have shown to decrease hospital stay and improve postoperative recovery. The most commonly used pain-relieving techniques for major abdominal surgeries are patient controlled analgesia with opioids, non-steroidal anti-inflammatory drugs and epidural analgesic techniques. Evidence suggests that epidural local anesthetic or local anesthetic-opioid techniques are the most effective in providing dynamic pain relief, after major surgical procedures. The duration of epidural local anesthetic analgesia is important, at least 24 hours and preferably 48 hours. The MASTER (Multicentre Australian Study of Epidural Anesthesia) RCT investigated the influence of perioperative epidural analgesia on outcome in 888 patients undergoing major abdominal surgery in between 1995 and 2001 from 25 hospitals in six countries. [1] These patients were considered high risk because of the presence of one or more important co-morbidities. In comparison with a control group who received intravenous(IV) opioid analgesia, they found no difference in mortality or in the incidence of major morbidity with the exception of the incidence of respiratory failure. However, postoperative analgesia was found to be clinically superior on the basis ofpain visual analog scores (VAS) in patients randomized to the epidural group. In the epidural group, mean pain VAS with coughing was 30% less than in the control group in the first 24 hours after surgery and 20% less for the remaining 48 hours [2]. A systemic overview was conducted by Rodgers and colleagues in year 2000 of 141 available randomized controlled trials, including 9559 patients till January 1997. It showed that the use of epidural and spinal block resulted in a statistically and clinically significant reduction in morbidity and mortality after surgery. [3]

Objectives

To testthe efficacy and evaluate the impact of epidural anesthesia and postoperative epidural analgesia on postoperative outcomes in obese patients undergoing incisional hernia surgery.

Material and methods

The aim of the study was to test the efficacy and evaluate the impact of epidural anesthesia and analgesia on postoperative outcomes in obese patients undergoing incisional hernia surgery. After obtaining institutional review board approval and written informed consent, an open randomized controlled trial was conducted on 60 patients scheduled for elective incisional hernia surgery.

In this open trial, patients undergoing elective incisional hernia surgery was randomized either to receive general anesthesia with subcutaneous morphine for postoperative analgesia (control group) or spinal anesthesia with postoperative epidural analgesia with bupivacaine and fentanyl.

Inclusion criteria

1. Patients aged between 18 and 60 years.
2. American Society Anesthesia class I, II.

(ASA Risk categorization)
3. Scheduled for incisional hernia as elective planned surgery.
4. Calculated Body Mass Index(BMI) more than 25.

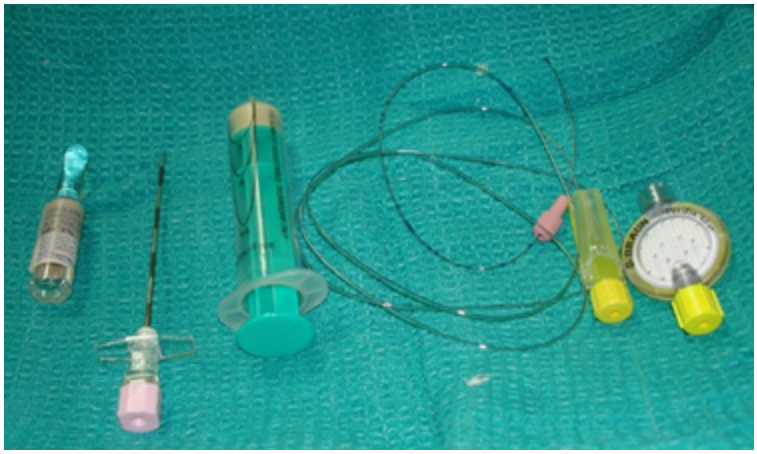
Exclusion criteria

1. Pediatric and geriatric age group.
2. Pregnancy.
3. Known allergy to any anesthetic agent.
4. Scheduled for emergency surgery.

Patients were block randomized (6-8) into two groups. Randomization were done using a computer-generated list by a person not included in the study and allocation to the two arms were concealed using serially numbered opaque envelopes.

All patients were premedicated with diazepam(0.1-0.2 mg/kg) and metoclopramide (0.25 mg/kg) orally an hour before surgery. In both groups, after intravenous access was secured, an infusion of crystalloid was commenced. Pulseoximetry, heart rate, noninvasive blood pressure and electrocardiogram was monitored during the procedure. All patients received prophylactic antibiotics immediately before surgery. Patients in this group were given IV morphine(0.1mg/kg) prior to anesthesia with sodium thiopental (3-5mg/kg) IV and fentanyl (1-2 mcg/kg) IV. Anesthesia was augmented with isoflurane (1%-2%),oxygen and nitrous oxide. Endotracheal intubation was facilitated with vecuronium (0.1- 0.2 mg/kg) IV and lungs were mechanically ventilated to end-tidal CO_2 30– 35 mm Hg. If indicated endotracheal intubation was accomplished using succinylcholine (1.0-1.5 mg/kg) or “awake“ under topical anesthesia using fiberoptic bronchoscopy. During the operation mean arterial pressure, heart rate, SpO_2 and $ETCO_2$ were recorded at five minutes intervals Maintenance anesthesia consisted of N_2O 70% with oxygen and end-tidal isoflurane 0.5%-1.0%. Intravenous Morphine was given as needed to maintain hemodynamic variables within 30% of baseline values. Patients who became hemodynamically unstable intraoperatively were switched over to air and oxygen 50%, end-tidal isoflurane 1.0% - 1.5% and vasopressors like ephedrine 6mg intravenous boluses. Vecuronium IV was given during surgery as needed for muscle relaxation. At the end of surgery, muscle relaxation was reversed by combination of neostigmine (0.04-0.08 mg/kg and glycopyrrolate (0.2-0.4 mg). Patients were extubated and transferred to post anesthesia care unit (PACU) and monitored until they met the recovery criteria of wakefulness and hemodynamic stability.

Patients in this group received subarachnoid block at the lumbar level for intraoperative anesthesia along with lumbar or thoracic epidural anesthesia for postoperative analgesia in the sitting position. The epidural space was identified with a 18-gauge Tuohy needle after local infiltration of skin and muscle with 2-3 ml of 2% lignocaine in the respective interspace by using the loss-of-resistance to air technique. A 20g catheter was threaded through the needle and 5cm of catheter was passed into the epidural space After confirmation of epidural space and negative aspiration for blood and CSF through the catheter, the epidural catheter and filter were firmly taped to the patient’s back. A test dose containing 3ml of 2%.



lignocaine with adrenaline 1:200000 was injected through the epidural catheter. Then, a 25 gauge Whitacre spinal needle was inserted either at L3-L4 or L4-L5 interspace, after local infiltration.
18 gauge Tuohy needle, stylet , plastic syringe to confirm the epidural space and 20 gauge catheter attached to microfilter was used for the study.

Postoperative period: Patients in group 1 received subcutaneous morphine (0.1 mg/kg) through a 24 gauge cannula fixed on the anterior chest wall in the subcutaneous plane. Subcutaneous morphine was administered every 4-6 hourly, the dose and frequency were adjusted according to the patient's weight and pain score. In the ward analgesic requirement were evaluated by the nurses using the visual analog scale (VAS) and patient's who complained of pain irrespective of VAS, received the rescue analgesic, injection, Pethidine 1mg/kg intramuscularly. There was no use of other drugs available like nonsteroidal anti- inflammatory as rescue analgesic in the study.

Results

A total of 62 patients were assessed for eligibility. Among them, 2 patients were excluded from the study because one of them did not satisfy the inclusion criteria and one patient refused to participate in the study. 60 patients were enrolled and randomized to two groups of 30.

Table 1: Demographic data

	Group 1 (Control) n=30	Group 2 (CSE) n=30
Age (Years) Mean Range	44.6 ± 10.2 23-60	43.3 ± 9.9 24- 60
Sex Male Female	10 20	2 28
Body Weight (Kg)Mean Range	67.7 ± 11.5 55 - 89	68.7 ± 11.4 55- 95
Height (cm)Mean Range	155.4 ± 6.6 140 - 171	155.5 ± 7.1 145 - 170
BMI (kg/m2) Range	25.3 - 31.2	25.1 – 34.2
ASA Risk (in no.)Gr I Gr II	14 16	12 18

Table 1 shows the demographic data of the sixty patients selected randomly, posted for incisionalhernia surgery in our hospital main theatre complex.
There were no significant difference in age, sex, weight, height and body mass index

distributionbetween the two groups.

Table 2: Surgical variables

	Group 1 (Control) n= 30	Group 2 (CSE) n =30
Size of Hernia		
Small (< 25cm2)	9 (30%)	9 (30%)
Medium (26-100cm2)	11 (36.7%)	11 (36.7%)
Large (> 100 cm2)	10 (33.3%)	10 (33.3%)
Site of hernia		
Paraumbilical	11 (36.7%)	10 (33.3%)
Umbilical	7 (23.3%)	3 (10%)
Infraumbilical	12 (40%)	17 (56.7)
Surgery time (mins)	104 ± 27.9	105.2 ± 32.4

There was no significant difference in the size, site of hernia and surgery time distribution betweenthe two groups. Most of the hernia were medium sized and their common site being infra umbilical.

Table 3: Post-Anesthesia Care Unit Variables

Parameters	Group 1 (Control) n=30	Group 2 (CSE) n=30	P value
Nausea	5(16.7%)	2 (6.7%)	0.23
Vomiting	4(13.3%)	0	0.03
Hypoxia	7(23.3%)	2 (6.7%)	0.07
Antiemetic therapy	5(16.7%)	2 (6.7%)	0.23
Analgesic requirement	9(30%)	1(3.3%)	0.006
Mean PACU time (mins)	113.5 ± 26.6	110.3 ± 29.6	0.66
Mean Pain Score (VAS)	3.5 ± 1.6	1.8 ± 1.4	<0.001

All variables are expressed in terms of number & percentage except PACU time and Pain score as mean in table 3. In the post anesthesia care unit, the incidence of vomiting (P=0.03), analgesic requirement (P=0.006) and the mean pain score was (P<0.001) were significantly high in control or general group. In CSE group incidence of vomiting, analgesic requirement and the mean pain score were comparatively less.

Table 4: Twenty-four-Hour (Intermediate) Postsurgical Outcomes

PostsurgicalOutcomes	Group I (Control) n= 30	Group II (CSE) n=30	P value
Nausea	14 (46.7%)	3 (10%)	0.002
Vomiting	3 (10%)	4 (13.3%)	0.68
Pruritus	4 (13.3%)	2 (6.7%)	0.38
Headache	1 (3.3%)	2 (6.7%)	0.55
Backache	0	1 (3.3%)	0.31
Time of Mobilization (mean)	28.9 ± 5.5	27 ± 4.9	0.15
Duration of Hospital Stay	Median = 4 min- 2, max - 12	Median =4 min-2, max- 8	

Describes the intermediate outcomes assessed in the ward twenty four hours after surgery. All variables are expressed in terms of number and percentage except time of mobilization as mean. Duration of hospital stay is expressed as median with

minimum and maximum values. The incidence of nausea (P=0.002) was significantly less in Combined spinal epidural group than in control or general group.

Table 5: Twenty-four-Hour (Intermediate) Postsurgical Outcomesbowel recovery

PostsurgicalOutcomes	Group I (Control)n= 30	Group II (CSE)n=30	P value
Mean Time of Passing Flatus (hrs)	26.9 ± 5.3	22.4 ± 4.1	<0.0001
Mean Time to Tolerate Sips of Fluid. (hrs)	23.8 ± 4.8	21.2 ± 4.6	0.03

Table 5 shows the difference of time of bowel recovery in the two groups in the postoperative period in ward. Time of bowel recovery was calculated from the time of passing flatus and the time to tolerate sips of fluid in hours after the surgery.

The time of passing flatus ($p<0.001$) and tolerate sips of fluid ($p=0.03$) were significantly less in combined spinal epidural group than in control or general group.

Discussion

The results of this prospective randomized study showed that obese patients undergoing elective incisional hernia surgery had better postoperative outcomes with epidural analgesia compared with parenteral opioids. This was likely a result of the positive effects of epidural analgesia on postoperative pain control, gastrointestinal motility and mobilization. Incisional hernia is the most common surgery performed in our surgical theatres and considered as a major abdominal surgery. Any surgery is associated with stress responses, which causes various organ dysfunctions. Pain relief is a powerful technique to modify surgical stress response. It has been assumed that sufficient pain relief will improve the surgical outcome and there is a common consensus that optimal pain relief mainly dynamic, is a prerequisite for early postoperative recovery. [5] The effect of epidural anesthesia and analgesia on fifty three high risk patients coming for major abdominal surgery has been studied in mid 1980_s by Yeager and colleagues, which has shown significant improvement in postoperative outcome.[1,4] When compared to control patients, patients who received epidural analgesia had a reduction in the overall postoperative complication rate ($P = 0.002$). Evidence suggests that epidural local anesthetic or local anaesthetic-opioid techniques are the most effective in providing dynamic pain relief, after major surgical procedures. The duration of epidural local analgesic is important, at least 24 hours and preferably 48 hours postoperatively. In our study sixty obese patients were randomized either to receive general anesthesia with subcutaneous morphine for postoperative analgesia (control group) or spinal anesthesia with postoperative epidural analgesia with bupivacaine and fentanyl (regional group). We had included patients satisfying the inclusion criteria of our study posted for elective incisional hernia surgery over the period of one year in our main theatre. We found more patients required rescue analgesic in PACU in the control group 30% compared to regional group 3.3%.

The incidence of nausea, vomiting and hypoxia were 6.7%, 0% and 6.7% in the CSE (combined spinal-epidural) group as compared to 16.6% ,13.3% and 27.7% respectively in control group, as immediate postoperative outcomes. The lower incidence of hypoxia in the CSE group of our study supports the findings of Fox et al, where110 obese patients receiving epidural analgesia for weight-reducing surgery in Canada had higher PaO_2 than patients

receiving general anesthesia.[6] The impact of obesity on the changes of pulmonary physiology make them prone for a higher chance of postoperative pulmonary complications like hypoxia, atelectasis, especially when undergoing abdominal surgery under general anesthesia. [7] These results were also suggestive of the respiratory benefits of epidural analgesia as Gelman and colleagues showed in 38 morbidly obese patients undergoing gastric bypass surgery in 1980. [8]

In PACU, 30% (9 out of 30) of the patients in control group required analgesia as compared to 3.3% (1out of 30) in CSE group. This was true as the mean pain score measured as VAS in patients who received general anesthesia and parenteral opiods was 3.5 as compared to patients who received regional technique 1.8. The time spent in postanesthesia care unit (PACU) by either group of patients was found to be similar. Similar to the MASTER (Multicentre Australian Study of Epidural Anesthesia) trial our study showed postoperative analgesia was found to be clinically superior on the basis of pain visual analog scores (VAS) in patients randomized to the epidural group. All the patients undergoing incisional hernia surgery were routinely catheterized, and were removed after 24 to 48 hours postoperatively. The effect of epidural analgesia, urinary retention was not noticed in our patients. The were higher incidence of patients developing pruritus in control group (13.3%) as compared to CSE group (6.7%). This was noted due to the use of parenteral opioids as the mode of postoperative analgesia, pruritus being a common side-effect . The results showed both mean time of passing flatus (22.4 hrs) and time to tolerate sips of fluid (21.2 hrs) in CSE group were found earlier than in control group ,26.9 hours and 23.8 hours respectively. This suggests the impact of epidural analgesia on time to bowel recovery, Transient postoperative ileus is commonly seen after abdominal surgery under general anesthesia, more in obese patients as use of larger dose of opioids required for optimal pain relief. Randomized trials by Jayr *et al* in 1993 and Carli *et al* in 2000 have demonstrated that the use of epidural opioids with a local anesthetic-based regimen is associated with significantly early return of gastrointestinal function after abdominal surgery. [9,10] In the study group of patients infraumbilical was the more commoner site of incisional hernia , and were medium sized ranging between $26cm^2$ -$100cm^2$. In combined spinal epidural group, there were more patients awake 76.7% than in control group whereonly 20% of the patients were awake. This was assessed in the surgical ward twenty-four hours after surgery. [11]

Conclusion

Combined spinal epidural is a superior alternative technique to general anesthesia with parenteral opioids in the post operative management of incisional hernia surgery for obese patients. Combined spinal epidural technique provides better pain relief, early bowel recovery, less incidence of hypoxia and nausea and better patient satisfaction in postoperative period in obese patients.

References

1. Rigg JRA, Jamrozik K, Myles PS, et al. Epidural anesthesia and analgesia and outcome of major surgery: a randomized trial. Lancet. 2002; 359:12 76–82.
2. W. Scott Jellish, Zuhair Thalji. A Prospective Randomized study comparing short and intermediate – term perioperative outcome variables after spinal or general anesthesia for lumbar disk and laminectomy surgery. Anesth Analg. 1996;83: 559-64.
3. A Rodgers A, Walker N, Schug S, et al. Reduction of postoperative mortality and morbidity with epidural or spinal anesthesia: results from overview of randomized trials. BMJ. 2000; 321:1493–7

4. Yeager MP, Glass DD, Neff RK, Brinck-Johnsen T. Epidural anesthesia and analgesia in high-risk surgical patients. Anesthesiology. 1987; 66: 729–36.
5. Kehlet H,Holte K. Effect of postoperative analgesia on surgical outcome.Br J Anesth. 2001; 87:62-72.
6.G. S. Fox, D. G. Whalley, and D. R. Bevan. Anesthesia for the morbidly obese: Experience with110 patients. Br. J. Anaesth. 1981; 53: 811-816.
7. Biring MS, Lewis MI, Liu JT, Mohsenifar Z: Pulmonary physiologic changes of morbid obesity. Am J Med Sci. 1999; 318:293–7.
8. Gelman S, Laws H, Potzick J, Strong S, Smith L, Erdemir H. Thoracic epidural vs balanced anesthesia in morbid obesity: an intraoperative and postoperative hemodynamic study. Anesth Analg. 1980; 59:9028.
9. Franco Carli, Nancy Mayo, Kristine Klubien. Epidural Analgesia enhances functional exercisecapacity and health related quality of life after colonic surgery. Anesthesiology 2002; 97: 540-9
10. Jayr, Christian, Thomas Hermes, Rey, Annie. Postoperative Pulmonary Complications Epidural Analgesia Using Bupivacaine and Opioids Versus Parenteral Opioids. Anesthesiology. 1993; 78(4):666-676,
11. Chakdoufi S., & Guerboub P. A. Kyste De La Neurohypophyse: À Propos D'un Cas. Journal of Medical Research and Health Sciences, 2023; 6(3): 2484–2489.